

## CLAIMS

- 1 1. For distilling a liquid, an evaporator-and-condenser unit comprising:
- 2 A) a heat exchanger that includes heat-transfer surfaces, forming at
- 3 least one condensation chamber and at least one evaporation
- 4 chamber, by which heat passes from the condensation chamber to
- 5 the heat exchanger;
- 6 B) an evaporation-chamber irrigation system whose rate of irrigation of
- 7 each said evaporation chamber has a respective average irrigation
- 8 rate and repeatedly reaches a respective peak irrigation rate that is
- 9 at least twice the average irrigation rate thereof; and
- 10 C) a vapor guide defining a vapor path along which it directs to the at
- 11 least one condensation chamber vapor thereby produced in the at
- 12 least one evaporation chamber.
- 1 2. An evaporator-and-condenser unit as defined in claim 1 wherein each
- 2 evaporation chamber's irrigation rate reaches its peak irrigation rate periodically.
- 1 3. An evaporator-and-condenser unit as defined in claim 1 further including a
- 2 compressor so interposed in the vapor path as to make the vapor pressure in the
- 3 at least one condensation chamber exceed that in the at least one evaporation
- 4 chamber.
- 1 4. An evaporator-and-condenser unit as defined in claim 3 wherein each
- 2 evaporation chamber's irrigation rate reaches its peak irrigation rate periodically.
- 1 5. An evaporator-and-condenser unit as defined in claim 1 wherein the irri-
- 2 gation system includes:
- 3 A) a main sprayer system that irrigates each said evaporation cham-
- 4 ber for at least the majority of the time; and

5           B)     an auxiliary sprayer system that irrigates each said at least one  
6                 evaporation chamber for only a minority of the time, the rate at  
7                 which each said evaporation chamber is irrigated while the auxiliary  
8                 sprayer system is irrigating it being at least twice the average irri-  
9                 gation rate thereof.

1     6.     An evaporator-and-condenser unit as defined in claim 5 wherein:

2           A)     the evaporator-and-condenser unit includes a plurality of said  
3                 evaporation chambers;

4           B)     the auxiliary sprayer system includes at least one auxiliary-system  
5                 nozzle, associated with a plurality of said evaporation chambers,  
6                 from which the auxiliary sprayer system produces an auxiliary-  
7                 system spray; and

8           C)     for each of the evaporation chambers with which the auxiliary-  
9                 system nozzle is associated, the auxiliary-system nozzle executes  
10                reciprocation between positions in which the auxiliary-system spray  
11                irrigates that evaporation chamber and positions in which the aux-  
12                iliary-system spray does not irrigate that evaporation chamber.

1     7.     An evaporator-and-condenser unit as defined in claim 6 further including a  
2             compressor so interposed in the vapor path as to make the vapor pressure in the  
3             at least one condensation chamber exceed that in the at least one evaporation  
4             chamber.

1     8.     An evaporator-and-condenser unit as defined in claim 5 wherein the aux-  
2             iliary sprayer system includes a plurality of auxiliary-system nozzles from which  
3             the auxiliary sprayer system produces an auxiliary-system spray by which the  
4             auxiliary sprayer system irrigates the at least one evaporation chamber.

1     9.     An evaporator-and-condenser unit as defined in claim 5 wherein the main  
2             sprayer system includes a plurality of main-system nozzles from which the main

3 sprayer system produces a main-system spray by which the main sprayer sys-  
4 tem irrigates the at least one evaporation chamber.

1 10. An evaporator-and-condenser unit as defined in claim 5 further including a  
2 compressor so interposed in the vapor path as to make the vapor pressure in the  
3 at least one condensation chamber exceed that in the at least one evaporation  
4 chamber.

1 11. An evaporator-and-condenser unit as defined in claim 1 wherein the heat  
2 exchanger is a rotary heat exchanger in which the heat-transfer surfaces are  
3 mounted for rotation about a central cavity from which the irrigation system irri-  
4 gates the evaporation chambers.

1 12. An evaporator-and-condenser unit as defined in claim 11 further including  
2 a compressor so interposed in the vapor path as to make the vapor pressure in  
3 the at least one condensation chamber exceed that in the at least one evapora-  
4 tion chamber.

1 13. An evaporator-and-condenser unit as defined in claim 11 wherein the irri-  
2 gation system includes:

- 3 A) a main sprayer system that irrigates each said evaporation cham-  
4 ber for at least the majority of the time; and  
5 B) an auxiliary sprayer system that irrigates each said at least one  
6 evaporation chamber for only a minority of the time, the rate at  
7 which each said evaporation chamber is irrigated while the auxiliary  
8 sprayer system is irrigating it being at least twice the average irri-  
9 gation rate thereof.

1 14. An evaporator-and-condenser unit as defined in claim 13 further including  
2 a compressor so interposed in the vapor path as to make the vapor pressure in

3 the at least one condensation chamber exceed that in the at least one evapora-  
4 tion chamber.

1 15. An evaporator-and-condenser unit as defined in claim 13 wherein:

- 2 A) the evaporator-and-condenser unit includes a plurality of said  
3 evaporation chambers;  
4 B) the auxiliary sprayer system includes at least one auxiliary-system  
5 nozzle, associated with a plurality of said evaporation chambers,  
6 from which the auxiliary sprayer system produces an auxiliary-  
7 system spray; and  
8 C) for each of the evaporation chambers with which the auxiliary-  
9 system nozzle is associated, the auxiliary-system nozzle executes  
10 reciprocation between positions in which the auxiliary-system spray  
11 irrigates that evaporation chamber and positions in which the aux-  
12 iliary-system spray does not irrigate that evaporation chamber.

1 16. An evaporator-and-condenser unit as defined in claim 15 further including  
2 a compressor so interposed in the vapor path as to make the vapor pressure in  
3 the at least one condensation chamber exceed that in the at least one evapora-  
4 tion chamber.

1 17. An evaporator-and-condenser unit as defined in claim 1 wherein:

- 2 A) the peak irrigation rate for each evaporation chamber exceeds the  
3 steady-state rate required to keep the heat-transfer surfaces  
4 thereof wetted; and  
5 B) the average irrigation rate for each evaporation chamber is no more  
6 than half the steady-state rate required to keep the heat-transfer  
7 surfaces of that evaporation chamber wetted.

1 18. An evaporator-and-condenser unit as defined in claim 17 wherein each  
2 evaporation chamber's irrigation rate reaches its peak irrigation rate periodically.

1 19. An evaporator-and-condenser unit as defined in claim 17 further including  
2 a compressor so interposed in the vapor path as to make the vapor pressure in  
3 the at least one condensation chamber exceed that in the at least one evapora-  
4 tion chamber.

1 20. An evaporator-and-condenser unit as defined in claim 17 wherein the irri-  
2 gation system includes:

- 3 A) a main sprayer system that irrigates each said evaporation cham-  
4 ber for at least the majority of the time; and  
5 B) an auxiliary sprayer system that irrigates each said at least one  
6 evaporation chamber for only a minority of the time, the rate at  
7 which each said evaporation chamber is irrigated while the auxiliary  
8 sprayer system is irrigating it being at least twice the average irri-  
9 gation rate thereof.

1 21. An evaporator-and-condenser unit as defined in claim 20 further including  
2 a compressor so interposed in the vapor path as to make the vapor pressure in  
3 the at least one condensation chamber exceed that in the at least one evapora-  
4 tion chamber.

1 22. An evaporator-and-condenser unit as defined in claim 20 wherein:

- 2 A) the evaporator-and-condenser unit includes a plurality of said  
3 evaporation chambers;  
4 B) the auxiliary sprayer system includes at least one auxiliary-system  
5 nozzle, associated with a plurality of said evaporation chambers,  
6 from which the auxiliary sprayer system produces an auxiliary-  
7 system spray; and  
8 C) for each of the evaporation chambers with which the auxiliary-  
9 system nozzle is associated, the auxiliary-system nozzle executes  
10 reciprocation between positions in which the auxiliary-system spray

11 irrigates that evaporation chamber and positions in which the aux-  
12 iliary-system spray does not irrigate that evaporation chamber.

1 23. An evaporator-and-condenser unit as defined in claim 22 further including  
2 a compressor so interposed in the vapor path as to make the vapor pressure in  
3 the at least one condensation chamber exceed that in the at least one evapora-  
4 tion chamber.

1 24. An evaporator-and-condenser unit as defined in claim 17 wherein the heat  
2 exchanger is a rotary heat exchanger in which the heat-transfer surfaces are  
3 mounted for rotation about a central cavity from which the irrigation system irri-  
4 gates the evaporation chambers.

1 25. An evaporator-and-condenser unit as defined in claim 24 further including  
2 a compressor so interposed in the vapor path as to make the vapor pressure in  
3 the at least one condensation chamber exceed that in the at least one evapora-  
4 tion chamber.

1 26. An evaporator-and-condenser unit as defined in claim 24 wherein the irri-  
2 gation system includes:

- 3 A) a main sprayer system that irrigates each said evaporation cham-  
4 ber for at least the majority of the time; and  
5 B) an auxiliary sprayer system that irrigates each said at least one  
6 evaporation chamber for only a minority of the time, the rate at  
7 which each said evaporation chamber is irrigated while the auxiliary  
8 sprayer system is irrigating it being at least twice the average irri-  
9 gation rate thereof.

1 27. An evaporator-and-condenser unit as defined in claim 26 further including  
2 a compressor so interposed in the vapor path as to make the vapor pressure in

3 the at least one condensation chamber exceed that in the at least one evapora-  
4 tion chamber.

1 28. An evaporator-and-condenser unit as defined in claim 26 wherein:

- 2 A) the evaporator-and-condenser unit includes a plurality of said  
3 evaporation chambers;  
4 B) the auxiliary sprayer system includes at least one auxiliary-system  
5 nozzle, associated with a plurality of said evaporation chambers,  
6 from which the auxiliary sprayer system produces an auxiliary-  
7 system spray; and  
8 C) for each of the evaporation chambers with which the auxiliary-  
9 system nozzle is associated, the auxiliary-system nozzle executes  
10 reciprocation between positions in which the auxiliary-system spray  
11 irrigates that evaporation chamber and positions in which the aux-  
12 iliary-system spray does not irrigate that evaporation chamber.

1 29. An evaporator-and-condenser unit as defined in claim 28 further including  
2 a compressor so interposed in the vapor path as to make the vapor pressure in  
3 the at least one condensation chamber exceed that in the at least one evapora-  
4 tion chamber.

1 30. For generating vapor from a liquid, a method comprising:

- 2 A) providing a heat exchanger that includes heat-transfer surfaces,  
3 forming at least one condensation chamber and at least one evapo-  
4 ration chamber, by which heat passes from the condensation  
5 chamber to the heat exchanger;  
6 B) irrigating each said evaporation chamber at a respective irrigation  
7 rate that has a respective average irrigation rate and so varies as  
8 repeatedly to reach a respective peak irrigation rate that is at least  
9 twice the respective average irrigation rate; and

10 C) directing into the at least one condensation chamber vapor thereby  
11 produced in the at least one evaporation chamber.

1 31. A method as defined in claim 30 wherein each evaporation chamber's irri-  
2 gation rate reaches its peak irrigation rate periodically.

1  
2 32. A method as defined in claim 30 wherein the method further includes so  
3 compressing vapor in the vapor path as to make the vapor pressure in the at  
4 least one condensation chamber exceed that in the at least one evaporation  
5 chamber.

6 33. A method as defined in claim 32 wherein each evaporation chamber's irri-  
7 gation rate reaches its peak irrigation rate periodically.

1 34. A method as defined in claim 30 wherein:

2 A) the peak irrigation rate for each evaporation chamber exceeds the  
3 steady-state rate required to keep the heat-transfer surfaces  
4 thereof wetted; and

5 B) the average irrigation rate for each evaporation chamber is no more  
6 than half the steady-state rate required to keep the heat-transfer  
7 surfaces of that evaporation chamber wetted.

1 35. A method as defined in claim 34 wherein each evaporation chamber's irri-  
2 gation rate reaches its peak irrigation rate periodically.

1 36. A method as defined in claim 34 wherein the method further includes so  
2 compressing vapor in the vapor path as to make the vapor pressure in the at  
3 least one condensation chamber exceed that in the at least one evaporation  
4 chamber.



- 1 37. A method as defined in claim 36 wherein each evaporation chamber's irri-
- 2 gation rate reaches its peak irrigation rate periodically.

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